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The importance of motor and perceptual learning in the educational process is discussed. It is hypothesized that an internalization of sensory-motor learnings is important to the perceptual and cognitive development of a child. Developmental and corrective motor training by physical educationalists is suggested. It is concluded that although the test battery by de Hirsch, Jansky, and Langford has a practical use, further development and validation are necessary before it can be used effectively by teachers and clinicians. On the basis of present knowledge, use of the Bender Motor Gestalt Test or the Berry Test of Visual-Motor Intergration, the Wepman Auditory Discrimination Test, the de Hirsch Categories Test and the Murphy-Durrell Letter Names Test are suggested as a screening device for first- and second-grade children. The Berry Test of Visual-Motor Integration, the Goodenough-Harris Drawing Test, classroom observation of the "Strauss Syndrome," the Wepman Auditory Discrimination Test, a spelling test, and the Durrell Visual Memory of Words Test are suggested for other elementary grades. References are listed. (BS)

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The Diagnosis of Sensory-Motor Disabilities

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The purpose of this paper is three fold in nature. The first purpose is to outline briefly the importance of motor and perceptual learning in the educational process; the second purpose is to critique the de Hirsch, Jansky, Langford technique for identifying children who may be potential reading failures; and the third purpose is to outline a diagnostic procedure, based on present knowledge, for identifying children with motor-perceptual handicaps.

Generally, it is acknowledged that the earliest learnings of a child are based on his sensory and motor experience. These experiences are developed into a body of sensory and motor knowledge that can be used by a child to manipulate or control his environment. According to the theory of Dunsing and Kephart (1), the development of perception is dependent upon the ability of a child to internalize his sensory and motor knowledge

as it is the standard by which he verifies his perceptions. Before a child is able to objectify and stabilize his environment, he must be able to integrate his motor knowledge with perceiving information. A child who cannot make this perceptual-motor match lives in a world of confused impressions. The higher level cognitive learnings are in turn influenced by organized perceptual patterns. Piaget (2) lends authoritative support to the theory that the early interactions that a child has with his environment are important to his later learnings. Research studies of the past, on the otherhand, show little correlation between a child's motor performance and mental ability. It may be hypothesised, however, that it is an internalization of sensory-motor learnings that are important to perceptual and cognitive development of a child rather than the overt motor skills and abilities that are demonstrated.

G. N. Getman (3) has developed an interesting model to demonstrate the interaction process between visual perception and the motor systems which he refers to as the visuomotor complex. This model attempts to show how perceptual and cognitive growth is dependent upon a child's early physiological experiences and learnings. Children, according to Getman, must organize and integrate their action systems before they can use their action systems to learn. The child is free to learn independently in the symbolic and conceptual world only when he has developed an integrated visuomotor system.

There is still something to be gained from developmental and corrective motor training even if motor systems are not so directly related to perceptual and cognitive growth as the theory of Dunsing, Kephart, and Getman suggest. Among the more salient reasons for motor training

are that this training would allow the child a better degree of concentration after he has had a chance to flex his muscles and body, that it is a divergent activity from the mental chore and body rigidity involved in seatwork, and that it would help a child to develop body awareness and a sense of laterality. Moreover, many psychologists believe that the development of motor skills may contribute significantly to the good mental health of a child. A child who is clumsy and uncoordinated may hold a different view of himself as he feels improvements are made in his physical agility and from the rewards that may come from the approving remarks of his peers.

The development of motor systems may well be in the realm of the physical educationalists. If this is so, then a concerted effort should be made to encourage these people to plan, organize, and research developmental and corrective motor training. That the people in physical education appear anxious to fulfill or accept this responsibility is evidenced by the research that is already underway in this area. Most schools, however, do not have the resources of trained personnel in physical education to give developmental or corrective motor training. This gap needs to be provided by the classroom teacher and the remedial reading specialist for the present. The danger that motor and perceptual training would infringe upon subject matter time requirements is unwarrented. It could be given as a part of the daily physical education period that is required in most states or as a desirable seatwork activity. Organized manuals are available to guide teachers in the procedures involved in training of this type. In a remedial situation, a short motor activity or visual exercise could revitalize a learning situation when restlessness and bordom begin to set in.

The second purpose of this paper is to critique the technique for determining potential reading failures as found in the book Predicting Reading Failures by de Hirsch, Jansky, and Langford (4). The rationale of the battery of tests as described in this book is based on de Hirsch's strong adherence to ascertaining the developmental level of children. This assumes that children who possess a lag in visual-motor organization and spatio-motor organization are not developmentally ready for reading. The battery of ten tests attempt to find the maturational level of students in fine motor patterning, visual-perceptual patterning, receptive language, expressive language, sentence development, matching ability, and word recognition ability. Failure of a child in seven or more of the ten tests indicates a developmental level too low for reading instruction. Dr. de Hirsch does not believe in waiting for maturation alone to take its course. She believes that one should find the modality difficulties of children and seek developmental training for each difficulty. She is also a strong advocate of transitional first grades for children who lack an adequate level of development.

While sympathetic with the philosophy of Dr. de Hirsch and, cognizant of the practical use that the test battery may serve, the preliminary study of de Hirsch, Jansky, and Langford needs further development and validation before it can effectively be used by teachers and clinicians. Dr. Robert Schweiker, a research specialist at the University of Massachusetts, pointed out that the statistical procedure was weak in that a large number of measures were correlated with few subjects. In the preliminary study, 10 tests out of 37 tests were chosen which best predict the reading failures from among 53 subjects.

Using this procedure, there exists a very large likelihood that 10 measures can be selected which predict very well for the chosen sample of 53 subjects, but may give practically no prediction for any other sample. This point is made in "Validity, Reliability, and Baloney" by Edward Cureton (5). Cureton had 29 subjects and used 85 baggage checks, which were numbered on one side, as the predictive items. He shook up the tags in a cocktail shaker, tossed them out on a desk, and recorded the numbers which appeared. He used this procedure with each subject. Twenty-four tags tended to appear more often for the good students than for the poor students. He assigned each student a score based on those 24 tags. These scores correlated .82 with the course marks of the students. Obviously, the tags had fallen randomly, so if he repeated the procedure, those selected 24 tags would correlate about zero with course marks. He did this to show the danger of selecting from many measures when the group is small. The problem of "shrinkage" is mentioned in standard statistics texts such as McNemar (6). When a few measures are selected on the basis of the date from one small group, they should not be used to score the same group. The shrinkage problem requires that the measures be tried on a new sample. In the de Hirsch study, the items are not random baggage tags, but the group is so small that the selected items may describe only specific characteristics of that specific group used in the study and may not be of much use with any other group. The authors of Predicting Reading Failure and the author of this paper are both involved in needed revalidation of the preliminary study. The former have approximately 500 subjects, while this author has 260 subjects. Both of these studies should elicit more generalizable information as to the

predective value of the de Hirsch battery of tests.

The scoring and testing procedure as outlined in the book Predicting Reading Failures suffers from some lack of information and needs to be refined. Based upon a research study and clinical work done at the University of Massachusetts, it was found that the following information or improvements should be made in the administration and scoring procedure. First, Dr. de Hirsch and her colleagues now use a two-cartoon sequence of pictures rather than The Three Bears story to determine the number of words a child will use in telling a story. Second, an additional category has been added to the Categories Test. Third, because of copyright laws the Horst Test cannot be used as illustrated in the book. Fourth, the ten words used in the Word Recognition I and II Test are not supplied. Fifth, a sample score sheet and recording sheet should be provided. Sixth, scores are recorded in the negative on eight tests and in the positive on two tests. It might be better to keep scoring procedure consistent. Seventh, more adequate directions should be given regarding the scoring of the Bender Visuo-Motor Test. It would be helpful if scoring examples were given.

The third purpose of this paper is to briefly outline a method of diagnosing children with perceptual-motor handicaps. A method for doing this is significant in Massachusetts since a State law will make it mandatory to conduct a diagnosis in the public schools to identify children who may be having perceptual-motor difficulties. In addition, the State will partially support schools which establish rooms for perceptual-motor handicapped children.

On the basis of present knowledge, the following testing procedure

will aid reading personnel in identifying children with perceptual-motor handicaps. Undoubtedly this procedure will change as new tests are developed. There appears to be a demand for testing devices in this area and usually a supply will follow the demand. For the first and second grade, the Bender Motor Gestalt Test or the Berry Test of Visual-Motor Integration, the Wepman Auditory Discrimination Test, the de Hirsch Categories Test, and the Murphy-Durrell Letter Names Test may well be used as a screening device. Children who fail to perform adequately on this screening test could be given the complete De Hirsch battery of tests, the Singerland Screening Tests For Identifying Children With Specific Language Disabilities, the Frostig Test of Visual Perception, and the Primary Mental Ability Test with special attention given to results on the perceptual speed and spacial test. When an adequately trained psychometrist is available, the Illinois Test of Psycholinguistic Abilities could be administered to help determine strengths and weaknesses in language behavior. The Illinois Test of Psycholinguist Abilities and the Frostig Test are particularly useful in formulating a corrective procedure.

The Berry Test of Visual-Motor Integration, the Goodenough-Harris Drawing Test, classroom observation of the "Strauss Syndrome", the Wepman Auditory Discrimination Test, a spelling test, and the Durrell Visual Memory of Words Test could be used effectively for screening purposes in the other elementary grades. The Singerland Tests For Identifying Children With Specific Language Disabilities, the Frostig Test of Visual Perception, and the Primary Mental Abilities Test might form part of the battery of tests given to those children who display sensory-motor difficulties during the screen procedure. These children

would also be given the more traditional type reading achievement tests.

The screening and diagnostic procedure as outlined will certainly not remain static. Psychologists and neurologists are becoming more active in developing new tests and materials in the sensory-motor area. Reading teachers and clinicians have an obligation to keep informed of ways to use these devices. A multi-disciplinary approach to diagnosing and correcting learning disorders is undoubtedly needed. The reading teacher could well take the most active role in diagnosing and correcting children with learning disorders due to a developmental lag or to a perceptual handicap with neurologists, psychologists, optometrists, pediatricians, and special educationalists in a supporting role. In more chronic cases of learning disorder, the reading teacher would act in a supporting role to other specialists. There is a challenge to reading personnel to see their role in proper prespective in diagnosing and teaching children with learning disorders.

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